

Listing of Claims

Claims (1-23): Canceled

Claim 24 (Currently Amended): A device for setting up a plurality of virtual circuits between a first end system and a second end system, said plurality of virtual circuits being set up on a network connecting said first end system to said second end system, wherein said first end system is a first ATM switch, said second end system is a second ATM switch, and said network is an ATM network, said device comprising:

an outbound interface coupled to said ATM network;

a message construction block coupled to said outbound interface;

a call control logic for causing said message construction block to construct a first signaling message requesting said plurality of virtual circuits to be set up, and to send said first signaling message on said network to said second end system;

wherein said first signaling message is a single signaling message, wherein said single signaling message comprises a plurality of information elements, wherein a first information element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits;

an inbound interface designed for receiving on said ATM network an acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first end system and said second end system is designed not to support setting up of said plurality of virtual circuits in response to said single signaling message; and

a parser designed for examining said acceptance message and forwarding said acceptance message to said call control logic.

Claim 25 (Previously Presented): The device of claim 24, further comprising a signaling application programming interface (API), said signaling API receiving a request for a group of virtual circuits from an external application, and communicating said request to said call control logic, wherein said call control logic causes said single signaling message to be sent in response to said request.

Claim 26 (Previously Presented): The device of claim 25, wherein said outbound interface sends said single signaling message in the form of a plurality of asynchronous transfer mode (ATM) cells, said device further comprising:

a signaling ATM adaptation layer (SAAL) output block to encapsulate data generated by said message construction block to generate said single signaling message, said SAAL output block being coupled to said outbound interface.

Claim 27 (Canceled)

Claim 28 (Currently Amended): The device of claim 24, wherein said second information element comprises a non-mandatory information element according to a specification used for signaling in said ATM network, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 29 (Previously Presented): The device of claim 28, wherein said specification comprises one of user to network interface (UNI) or network to network interface (NNI).

Claim 30 (Previously Presented): The device of claim 24, further comprising an inbound interface designed for receiving another acceptance message, said another acceptance message indicating that a plurality of switches in a connection path between said first ATM switch and said second ATM switch have set up said plurality of virtual circuits.

Claim 31 (Currently Amended): The device of claim ~~24~~ 30, wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits, wherein said call control logic designed for causing said message construction block to send a second signaling message to activate at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 32 (Previously Presented): The device of claim 30, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first ATM switch and said second ATM switch support a plurality of groups including said group, said device further

comprising a memory designed for storing a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 33 (Previously Presented): The device of claim 32, wherein said memory is designed to further store a plurality of call reference structures and a plurality of per-VC structures,

wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call, and

wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 34 (Previously Presented): The device of claim 33, wherein said device comprises a switch in said connection path, said memory is further designed for storing a plurality of switch structures, wherein each of said plurality of switch structures stores a mapping of an identifier of each of said virtual circuit in inbound direction to another identifier of the virtual circuit in outbound direction.

Claim 35 (Previously Presented): The device of claim 33, wherein said first ATM switch comprises an edge router, wherein said single signaling message contains a bundle identifier which is propagated without translation by each of said plurality of switches.

Claim 36 (Previously Presented): The device of claim 30, wherein said acceptance message and said single signaling message are both formed according to a common format, wherein said common format contains a field which indicates whether a message comprises said acceptance message or said single signaling message.

Claim 37 (Previously Presented): The device of claim 36, wherein said format allows a range of virtual circuits to be specified, said format further allowing a plurality of traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality of

parameters in said single signaling message specify the desired parameters and said plurality of parameters in said acceptance message specify the accepted parameters.

Claims 38-78: (Canceled)

Claim 79 (Currently Amended): A method of setting up a plurality of virtual circuits between a first asynchronous transfer mode (ATM) switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, said method comprising:

sending on said ATM network to said second ATM switch a single signaling message requesting said plurality of virtual circuits to be set up;

receiving an acceptance message, said acceptance message indicating that a plurality of ATM switches in a connection path between said first ATM switch and said second ATM switch have set up said plurality of virtual circuits in response to said single signaling message,

wherein said plurality of ATM switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits; and

sending a second signaling message to ~~activate~~ complete provisioning of at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 80 (Currently Amended): The method of claim 79, wherein said acceptance message is received only if each of said plurality of ATM switches is designed to support set up of said plurality of virtual circuits, wherein said single signaling message comprises a plurality of information elements, wherein a first information element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits, said method further comprising:

receiving another acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between

said first ATM switch and said second ATM switch is designed not to support set up of said plurality of virtual circuits in response to said single signaling message.

Claim 81 (Currently Amended): The method of claim 80, wherein said second information element comprises a non-mandatory information element according to a specification used for signaling in said ATM network, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 82 (Previously Presented): The method of claim 81, wherein said specification comprises one of user to network interface (UNI) or network to network interface (NNI).

Claims 83 - 84 (Canceled)

Claim 85 (Previously Presented): The method of claim 79, wherein said fewer than said plurality of virtual circuits corresponds to one virtual circuit such that only one virtual circuit is provisioned in response to said single signaling message.

Claim 86 (Previously Presented): The method of claim 85, wherein said sending is performed from one of said first ATM system or said plurality of ATM switches.

Claim 87 (Currently Amended): The method of claim 79, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first ATM switch and said second ATM switch support a plurality of groups including said group, said method further comprising maintaining a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 88 (Previously Presented): The method of claim 87, further comprising:
maintaining a plurality of call reference structures, wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call; and

maintaining a plurality of per-VC structures, wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 89 (Previously Presented): The method of claim 88, wherein said sending, said receiving and each of said maintaining are performed in a switch contained in said connection path, said method further comprising:

maintaining a plurality of switch structures, wherein each of said plurality of switch structures stores a mapping of an identifier of each of said virtual circuit in inbound direction to another identifier of the virtual circuit in outbound direction;

mapping each identifier received in inbound direction to a corresponding identifier in outbound direction using said plurality of switch structures.

Claim 90 (Previously Presented): The method of claim 89, wherein said first ATM switch comprises an edge router and wherein said method is performed in said edge router, wherein said single signaling message contains a bundle identifier which is propagated without translation by each of said plurality of switches.

Claim 91 (Previously Presented): The method of claim 90, wherein each of said plurality of virtual circuits comprises a switched virtual circuit.

Claim 92 (Previously Presented): The method of claim 79, wherein said acceptance message and said single signaling message are both formed according to a common format, wherein said common format contains a field which indicates whether a message comprises said acceptance message or said single signaling message.

Claim 93 (Previously Presented): The method of claim 92, wherein said format allows a range of virtual circuits to be specified, said format further allowing a plurality of traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality of parameters in said first signaling message specify the desired parameters and said plurality of parameters in said acceptance message specify the accepted parameters.

Claim 94 (Previously Presented): The method of claim 93, further comprising sending a release message requesting release of another range of virtual circuits.

Claim 95 (Previously Presented): A method of supporting the setting up of a plurality of virtual circuits between a first ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, each of said plurality of virtual circuits terminating at said first ATM switch and said second ATM switch, said method being performed in a device, said method comprising:

- receiving from said first ATM switch on said ATM network a single signaling request requesting said plurality of virtual circuits to be set up;

- sending an acceptance message if said plurality of virtual circuits can be set up between said device and said second ATM switch in response to said single signaling request alone; and

- provisioning fewer than said plurality of virtual circuits to said second ATM switch before performing said sending.

Claims 96 - 98 (Canceled)

Claim 99 (Currently Amended): The method of claim 95, further comprising:

- receiving a second signaling message requesting activation of at least one of said not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

- completing provisioning of said at least one of said not-yet-provisioned virtual circuits in response to receiving said second signaling message; and

- sending a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claim 100 (Previously Presented): The method of claim 99, wherein said single signaling request contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, said method further comprising:

- storing said plurality of parameters associated with said range of virtual circuits; and

provisioning said range of virtual circuits using said plurality of parameters,
whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 101 (Previously Presented): The method of claim 100, wherein said single signaling request and said second signaling message are in received in the form of ATM cells.

Claim 102 (Previously Presented): The method of claim 101, wherein said device comprises one of said first ATM switch, said second ATM switch, or a switch in the path of said plurality of virtual circuits connecting said first ATM switch to said second ATM switch.

Claim 103 (Previously Presented): An apparatus for supporting the setting up of a plurality of virtual circuits between a first ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, said plurality of virtual circuits terminating at said first ATM switch and said second ATM switch, said apparatus comprising:

an in-bound interface for receiving from said first ATM switch on said ATM network a single signaling request requesting said plurality of virtual circuits to be set up;

a call control logic for receiving said single signaling message, said apparatus sending an acceptance message if said plurality of virtual circuits can be set up between a device containing said apparatus and said second ATM switch in response to said single signaling request alone,

wherein said call control logic is for provisioning fewer than said plurality of virtual circuits to said second ATM switch before sending said acceptance message.

Claims 104 - 106 (Canceled)

Claim 107 (Previously Presented): The apparatus of claim 103, wherein said inbound interface is designed to receive a second signaling message requesting activation of at least one of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits,

wherein said call control logic is configured to complete provisioning of said at least one of said not-yet-provisioned virtual circuits and then to send a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claim 108 (Previously Presented): The apparatus of claim 107, wherein said single signaling message contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, said apparatus further comprising a memory storing said plurality of parameters associated with said range of virtual circuits, wherein said call control logic is for provisioning said range of virtual circuits using said plurality of parameters, whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 109 (Previously Presented): The apparatus of claim 108 comprising one of said first ATM switch, said second ATM switch or a switch in the path of said plurality of virtual circuits connecting said first ATM switch to said second ATM switch.

Claim 110 (Currently Amended): A device for setting up a plurality of virtual circuits between a first ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, said plurality of virtual circuits terminating at said first ATM switch and said second ATM switch, said device being located in a communication path between said first ATM switch and said second ATM switch, said device comprising:

means for sending on said ATM network to said second ATM switch a single signaling message requesting said plurality of virtual circuits to be set up, wherein said single signaling message comprises a plurality of information elements, wherein a first information element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits; and

means for receiving an acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first ATM switch and said second ATM switch is designed not to support set

up of said plurality of virtual circuits in response to said single signaling message.

Claim 111 (Canceled)

Claim 112 (Currently Amended): The device of claim 110, wherein said second information element comprises a non-mandatory information element according to a specification used for signaling in said ATM network, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 113 (Previously Presented): The device of claim 112, wherein said specification comprises one of user to network interface (UNI) or network to network interface (NNI).

Claim 114 (Previously Presented): The device of claim 110, each of said plurality of switches in a connection path between said first ATM switch and said second ATM switch is designed to support said plurality of virtual circuits, said device further comprising:

means for receiving another acceptance message, said another acceptance message indicating that a plurality of switches in a connection path between said first ATM switch and said second ATM switch have set up said plurality of virtual circuits.

Claim 115 (Previously Presented): The device of claim 114, wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits, said device further comprising:

means for sending a second signaling message to activate at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 116 (Previously Presented): The device of claim 115, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end system and said second end system support a plurality of groups including said group, said device further comprising means for storing a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 117 (Previously Presented): The device of claim 116, further comprising:

means for storing a plurality of call reference structures, wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call; and

means for a plurality of per-VC structures, wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 118 (Previously Presented): A device for supporting the setting up of a plurality of virtual circuits between a first ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, each of said plurality of virtual circuits terminating at said first ATM switch and said second ATM switch, said device comprising:

means for receiving from said first ATM switch on said ATM network a single signaling request requesting said plurality of virtual circuits to be set up;

means for sending an acceptance message if said plurality of virtual circuits can be set up between said device and said second ATM switch in response to said single signaling request alone; and

means for provisioning fewer than said plurality of virtual circuits to said second ATM switch before performing said sending.

Claims 119 - 121 (Canceled)

Claim 122 (Currently Amended): A computer readable medium ~~carrying~~ storing one or more sequences of instructions for causing a device to set up a plurality of virtual circuits between a first ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, each of said plurality of virtual circuits terminating at said first ATM switch and said second ATM switch, said device being located in a communication path located between said first ATM switch and said second ATM switch, wherein execution of said one or more sequences of instructions by one or more processors contained in said device causes said ~~one or more~~

~~processors~~ device to perform the actions of:

sending on said ATM network to said second ATM switch a single signaling message requesting said plurality of virtual circuits to be set up;

receiving an acceptance message, said acceptance message indicating that a plurality of switches in a connection path between said first ATM switch and said second ATM switch have set up said plurality of virtual circuits in response to said single signaling message,

wherein said plurality of switches accept said plurality of virtual circuits but immediately provision fewer than said plurality of virtual circuits; and

sending a second signaling message to ~~activate~~ complete provisioning of at least one of a plurality of not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits.

Claim 123 (Currently Amended): The computer readable medium of claim 122, wherein said acceptance message is received only if each of said plurality of ATM switches is designed to support set up of said plurality of virtual circuits, wherein said single signaling message comprises a plurality of information elements, wherein a first information element is designed to request set up of a single virtual circuit comprised in said plurality of virtual circuits, and a second information element is designed to request set up of a second plurality of virtual circuits comprised in said plurality of virtual circuits, further comprising:

receiving another acceptance message indicating that only said single virtual circuit is possible to be provisioned if any of a plurality of switches in a connection path between said first ATM switch and said second ATM switch is designed not to support setting up of said plurality of virtual circuits in response to receiving said single signaling message.

Claim 124 (Currently Amended): The computer readable medium of claim 123, wherein said second information element comprises a non-mandatory information element according to a specification used for signaling in said ATM network, wherein non-mandatory information elements can be ignored by said plurality of switches according to said specification.

Claim 125 - 126 (Canceled)

Claim 127 (Previously Presented): The computer readable medium of claim 122, wherein said fewer than said plurality of virtual circuits corresponds to one virtual circuit such that only one virtual circuit is provisioned in response to said first signaling message.

Claim 128 (Previously Presented): The computer readable medium of claim 127, wherein said plurality of virtual circuits is treated as a group of virtual circuits, wherein said first end system and said second end system support a plurality of groups including said group, further comprising maintaining a bundle structure associated with each of said plurality of groups, wherein said bundle structure stores information identifying the specific plurality of virtual circuits forming the corresponding group.

Claim 129 (Previously Presented): The computer readable medium of claim 128, further comprising:

- maintaining a plurality of call reference structures, wherein each of said plurality of call reference structures maintains the state of a call, wherein signaling messages related to each group are received on a corresponding call; and

- maintaining a plurality of per-VC structures, wherein each per-VC structure stores information related to a plurality of call parameters accepted for a corresponding one of said plurality of virtual circuits.

Claim 130 (Previously Presented): The computer readable medium of claim 129, wherein said sending, said receiving and each of said maintaining are performed in a switch contained in said connection path, further comprising:

- maintaining a plurality of switch structures, wherein each of said plurality of switch structures stores a mapping of an identifier of each of said virtual circuit in inbound direction to another identifier of the virtual circuit in outbound direction;

- mapping each identifier received in inbound direction to a corresponding identifier in outbound direction using said plurality of switch structures.

Claim 131 (Previously Presented): The computer readable medium of claim 129, wherein said first end system comprises an edge router and wherein said actions are

performed in said first edge router, wherein said first signaling message contains a bundle identifier which is propagated without translation by each of said plurality of switches.

Claim 132 (Previously Presented): The computer readable medium of claim 122, wherein said acceptance message and said first signaling message are both formed according to a common format, wherein said common format contains a field which indicates whether a message comprises said acceptance message or said first signaling message.

Claim 133 (Previously Presented): The computer readable medium of claim 132, wherein said format allows a range of virtual circuits to be specified, said format further allowing a plurality of traffic parameters to be specified for all of said range of virtual circuits, wherein said plurality of parameters in said first signaling message specify the desired parameters and said plurality of parameters in said acceptance message specify the accepted parameters.

Claim 134 (Previously Presented): The computer readable medium of claim 133, further comprising sending a release message requesting release of another range of virtual circuits.

Claim 135 (Currently Amended): A computer readable medium storing ~~carrying~~ one or more sequences of instructions for causing a device to support the setting up of a plurality of virtual circuits between a first ATM switch and a second ATM switch, said plurality of virtual circuits being set up on a ATM network connecting said first ATM switch to said second ATM switch, each of said plurality of virtual circuits terminating at said first ATM switch and said second ATM switch, wherein execution of said one or more sequences of instructions by one or more processors contained in said device causes said device ~~one or more processors~~ to perform the action of:

receiving from said first ATM switch on said ATM network a single signaling request requesting said plurality of virtual circuits to be set up;

sending an acceptance message if said plurality of virtual circuits can be set up between said device and said second ATM switch in response to said single signaling request

alone; and

provisioning fewer than said plurality of virtual circuits to said second end system before performing said sending.

Claims 136 - 138 (Canceled)

Claim 139 (Previously Presented): The computer readable medium of claim 135, further comprising:

receiving a second signaling message requesting activation of at least one of said not-yet-provisioned virtual circuits comprised in said plurality of virtual circuits;

completing provisioning of said at least one of said not-yet-provisioned virtual circuits; and

sending a completion message indicating said at least one of said not-yet-provisioned virtual circuits have been activated.

Claim 140 (Previously Presented): The computer readable medium of claim 139, wherein said first signaling message contains a plurality of parameters related to a range of virtual circuits comprised in said plurality of virtual circuits, further comprising:

storing said plurality of parameters associated with said range of virtual circuits; and

provisioning said range of virtual circuits using said plurality of parameters,

whereby said plurality of parameters are transmitted only once for provisioning said range of virtual circuits.

Claim 141 (Canceled)